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ABSTRACT

With the passage of the Reading Excellence Act, states and their schools have increasingly emphasized the implementation of research-based literacy interventions, and both parties are eager to know the effectiveness of their efforts. However, the evaluation of the impact of any reform is complicated by the presence of other types of interventions that concurrently exist in schools. Using two sequential OLS regression models, this study examined the impact of literacy programs funded by Indiana's Early Literacy Grant Intervention Program (ELIGP) on schools' standardized test scores and rates of retention and special education referral. In each model, blocks of variables pertaining to school characteristics, professional development, parent involvement, and instructional program features (extracted using factor analysis) were added sequentially, and their effects on the three outcome variables were estimated. The two models differed in that the first included categories of ELIGP funding, whereas the second included the type of research-based intervention without regard to source of funding. The final models were similar in terms of coefficient values as well as predicted variance, with some exceptions. The presence of Literacy Collaborative, First Steps, and Success for All in schools, regardless of funding source, were all associated with lower special education referral rates,and Success for All was, in addition, negatively associated with retention rates. Although the impact of Reading Recovery was more complicated, it appeared to be associated with lower retention rates when the program was sustained over time. These findings suggest that research-based literacy programs, including those funded by ELIGP and other sources, enhance student outcomes even after controlling for effects of other interventions. Contains 1 figure, 7 tables of data, 16 references, and an appendix of supplementary analysis. (Author/SR)

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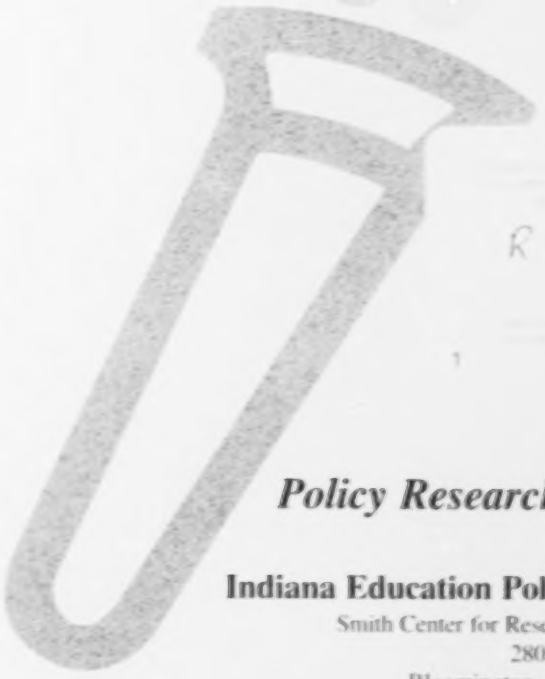

Policy Research Report

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Research-Based Reading Interventions:

The Impact of Indiana's Early Literacy Grant Program

Abstract

With the passage of the Reading Excellence Act, states and their schools have increasingly emphasized the implementation of research-based literacy interventions, and both parties are eager to know the effectiveness of their efforts. However, the evaluation of the impact of any reform is complicated by the presence of other types of interventions that concurrently exist in schools. Using two sequential OLS regression models, this study examined the impact of literacy programs funded by Indiana's Early Literacy Grant Intervention Program (ELIGP) on schools' standardized test scores and rates of retention and special education referral. In each model, blocks of variables pertaining to school characteristics, professional development, parent involvement, and instructional program features (extracted using factor analysis) were added sequentially, and their effects on the three outcome variables were estimated. The two models differed in that the first included categories of ELIGP funding whereas the second included the type of research-based intervention without regard to source of funding. The final models were similar in terms of coefficient values as well as predicted variance, with some exceptions. The presence of Literacy Collaborative, First Steps, and Success for All in schools, regardless of funding source, were all associated with lower special education referral rates and Success for All was, in addition, negatively associated with retention rates. Although the impact of Reading Recovery was more complicated, it appeared to be associated with lower retention rates when the program was sustained over time. These findings suggest that research-based literacy programs, including those funded by ELIGP and other sources, enhance student outcomes even after controlling for the effects of other interventions.

Introduction

With the passage of the *Reading Excellence Act* (P. L. 105-277) states have the opportunity to develop and fund research based interventions to improve student outcomes related to early reading acquisition. However, special funding for new programs in early reading is not implemented in isolation of other state policies. States already shape early reading curriculum and instruction through curriculum guidelines, the implementation of Title I and Special Education funding, and other state programs. In addition, schools can seek funding from other sources, including the Comprehensive School Reform Demonstration Project (CSRD), for interventions that focus on early reading. Thus, states need to evaluate the impact of new programs using a method that controls for the other types of interventions that schools may have implemented, as well as for the basic curriculum in reading.

With the completion of the National Research Council's report *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998) and passage of the *Reading Excellence Act*, there has been an increased emphasis on research based reading reforms. In the past few decades, advocates of specific reforms have conducted research on programs (e.g., Slavin et al., 1996). For example, Success for All received favorable comments in the National Research Council's report. In contrast, Reading Recovery was viewed less favorably because research was not as conclusive. However, whether states develop their own intervention models or provide support for schools to select from proven methods, there is a clear emphasis on selecting and implementing methods that have a research base. However, there are few studies that actually examine the impact of different types of reading interventions within state systems (e.g., St. John, Manset, Hu, Simmons, & Michael, 2000). Therefore, states face a new challenge in the development of evaluations to assess the effects of the interventions they fund through the *Reading Excellence Act* or from other sources.

This paper presents the results of a three-year study of early reading interventions in Indiana. Indiana's Early Literacy Intervention Grant Program (ELIGP) gave schools the opportunity to choose from a set of research-based interventions, or schools could design their own research-based intervention. However, schools could also seek funding for research-based interventions from other sources, including Title I. Thus, while it was

important to assess the impact of the new funding program, it was necessary to do so in a way that controlled for the other types of interventions that schools may have implemented. Below we provide background on our approach to the study, describe our research methods, summarize the findings, and consider the implications.

Background

The evaluation of early reading interventions is complicated by the fact that most research on early reading has been conducted on single reforms (Snow et al., 1998). Only a few studies have even compared the effects of multiple reforms (e.g., Pinnell, Lyons, DeFord, Bryk, & Selzer, 1994). Given that Indiana's ELIGP funded a diverse array of interventions, and both funded schools and other schools in the state had the opportunity to seek funding for their interventions from other sources, we needed a dynamic model to assess the impact of the funded interventions. Below we describe the Early Literacy Intervention Grant Program.

The Program

The Early Literacy Intervention Grant Program has provided categorical grants to schools on an annual basis since 1997. Schools apply to the Indiana Department of Education in response to an RFP. Funding provided for training in Reading Recovery is available on request. In addition, schools can apply for competitive grants for class-wide and school-wide interventions as part of the Other Early Literacy Interventions (OELI) component of ELIGP. ELIGP was implemented in a complex environment in which schools could also seek funding from CSRD and Title I, as well as other federal, state, local, and private sources.

The ELIGP was initiated in 1997-98 as part of a new state program funded late in the legislative session. The first year of the program, 142 schools were funded in the OELI program and 140 schools received funds for training teachers through Reading Recovery (see Table 1). The ELIGP grants provided supported for comprehensive interventions, but schools did not have much time between the announcement and funding so during the first year of funding, school corporations[1] that had active grant writing units were more likely to apply.

[1] The state of Indiana uses the term "school corporation" instead of "school district" to designate the taxation and governance unit for public schools. Usually school corporations are also county offices of schools, although there is more than one school corporation in some counties. In the first year, school

Table 1 Grant Amounts and Number of Projects

PROGRAM TYPE	AMOUNT STATE $[2]	CORPORATIONS WITH	SCHOOLS WITH	ESTIMATED STUDENTS[4]
Reading Recovery trainers[1]	596,482	10	NA	NA
Reading Recovery	$1,104,000	70	140	1855[3]
Other (includes LC and FDK[5])	1,662,335	54	142	7830
Totals	2,766,335	107	262	9685

Notes:
[1] The $596,482 for the training of ten new Reading Recovery trainers (teacher leaders) was allocated directly to Purdue University, rather than to the school corporations.
[2] The state funding is derived from information provided with the approved applications, rather than from surveys.
[3] The number of Reading Recovery teachers trained this year was 184. Reading Recovery teachers in training do not serve as many students as do fully trained teachers (at 8 students/year, 184 fully trained teachers serve about 1,472 students). A teacher in training might serve half that number of students (736). To be generous, we assumed 6 students per teacher, which yields 1,104. One question on the survey asks respondents to indicate the expected number of students served. The sum for the 50 Reading Recovery surveys is 1,501 students served by 125 teachers, or 12 students reported served by Reading Recovery teachers. This is twice the number of students usually said to be served by a teacher while in the training year.
[4] The estimated number of students is derived from estimates provided in the survey responses for corporations that completed surveys and from the estimates in the applications for corporations that did not return the surveys.
[5] FDK = Full-Day Kindergarten.

Source: Early Literacy Intervention Grant Program Survey, 1998.

In the second and third years of the program, the ELIGP grant process became more competitive with the number of applications substantially exceeding the number of grants that could be funded. In addition, information on a diverse array of research-based reading interventions was developed and distributed to schools (e.g., St. John, Bardzell, & Associates, 1999). However, the Reading Recovery (RR) portion of the ELIGP remained available for any school that wanted to have a teacher trained. In addition, the program provided support for the training of Reading Recovery trainers. Schools that had teachers trained through Reading Recovery needed to secure other funds to handle the class size reduction that resulted from pulling out students for Reading Recovery.[2] Therefore demand for training through Reading Recovery was somewhat constrained by the amount of funds available to schools. Thus while the funding available for OELI was constrained by demand for Reading Recovery, demand for Reading Recovery was, in turn, constrained by availability of other resources in schools.

corporations submitted ELIGP applications on behalf of schools. In subsequent years, individual schools made applications.

[2] Reading Recovery is a one-on-one pullout program (Bardzell, 1999).

During the three years examined in this study, the ELIGP provided services to 17,882 students through Reading Recovery and 35,509 students through OELI. Over the three years, the majority of school corporations received funding in at least one school. During each year of the program, we conducted surveys of funded and non-funded schools. In this analysis, we combine survey results from across the three years to build an understanding of the impact of funding.

The ELIGP funded a diverse array of interventions. OELI programs funded interventions in grades 1-3 (OELI 1-3), full-day kindergarten programs[3] (OELI-FDK), other OELI kindergarten programs (OELI-K), and pre-kindergarten programs (OELI-PK), such as Even Start. The types of nationally known interventions that were funded through OELI included:

- Success for All, a comprehensive restructuring method that has received national attention (Slavin et al., 1994; Slavin et al., 1996).
- Literacy Collaborative, a classroom-based intervention currently being pilot tested by Ohio State University (1998) and Purdue University. It is designed to complement Reading Recovery instruction and requires participation in Reading Recovery.
- First Steps, a classroom-wide intervention developed in Australia (e.g., Deschamp, 1995).
- Even Start, a nationally recognized approach to providing supplemental instruction to pre-kindergarten students (Gamse, Conger, Elson, & McCarthy, 1997).
- Four Blocks Method, a classroom-wide intervention that was developed by Cunningham (1991).
- Other locally developed interventions proposed by schools, possibly in collaboration with universities or other providers.

Given that there was extensive diversity in the types of programs that were funded, the project team needed to develop an approach to evaluation that could examine the impact of diverse types of interventions. It was not possible to simply compare

funded and non-funded schools because it was possible that the interventions were simultaneously being implemented by comparison schools. For example, the Indiana Department of Education provided workshops on the Four Blocks Method and other interventions where all schools were invited, funded or not. Thus, it was necessary to develop a study approach that controlled for the features of the reading programs in schools, as well as for the characteristics of the students in schools.

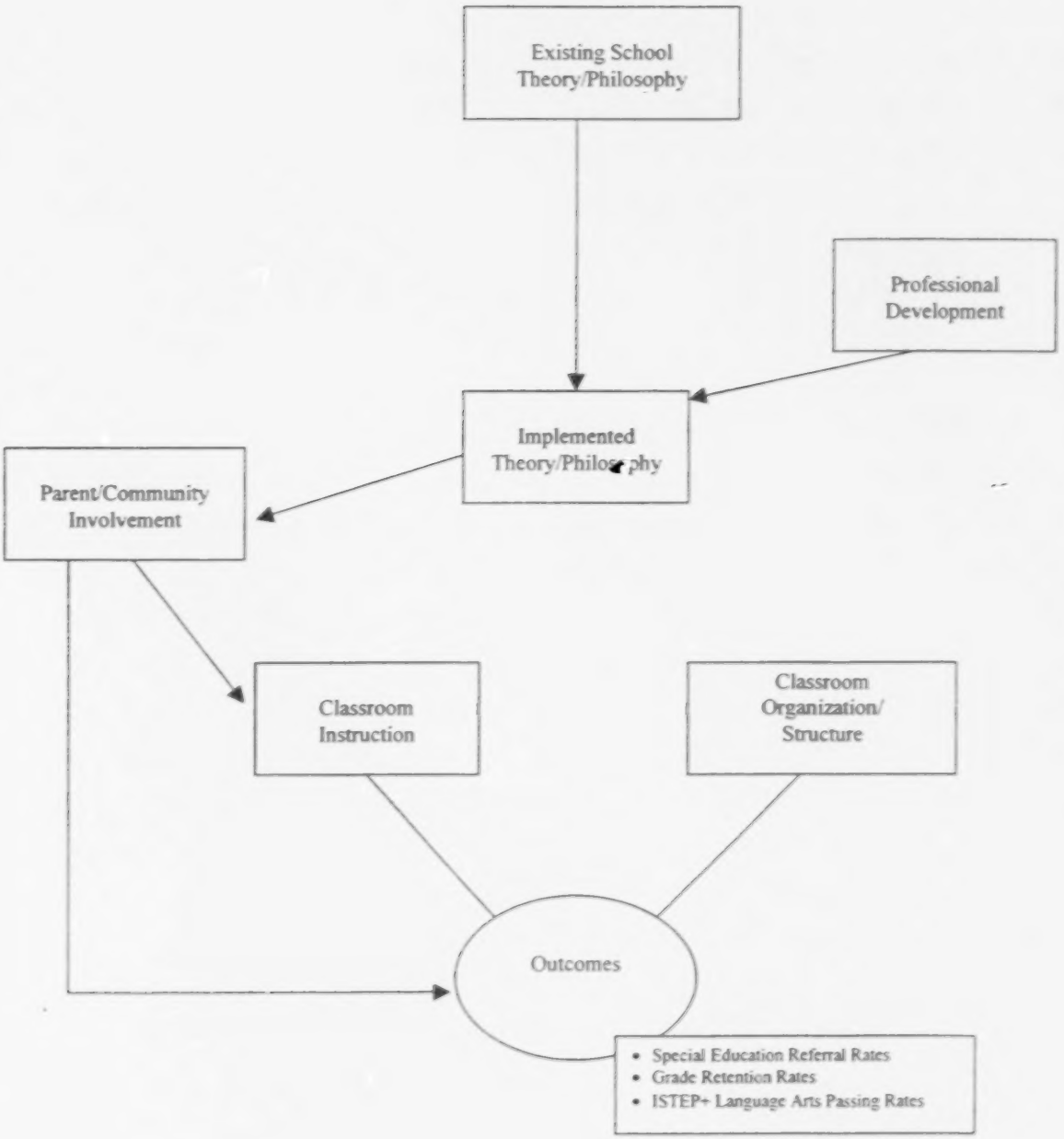
A Framework for Assessing the Impact of Interventions

A new conceptual framework was developed to guide this study (St. John et al., 1998; St. John, Manset, Hu, Simmons, & Michael, 2000). The framework, developed from a review of the literature on early reading interventions, provided a meta-structure for analyzing these programs and assessing their impact (Figure 1). Six dimensions of literacy programs were identified that can influence literacy outcomes: existing theories and philosophies in the school, professional development features, implemented theoretical/philosophical features of the program, parent involvement features, classroom instruction features, and organizational/structural features. Our analyses focused on the ways these features of early literacy programs influence three outcomes: special education referrals, retention in grade level, and passing rates for standardized reading tests. Conceptually, we identified the referral and retention rates as attainment-related outcomes and passing rates as an achievement-related outcome.

The survey instrument was developed in two stages. First, we reviewed the designs of various interventions to identify program features that were integral to a range of intervention programs (St. John et al., 1998). We classified these features into the six categories and developed standard definitions. As a second step, we integrated features and their descriptions into a survey instrument that we used to examine the characteristics of early literacy programs. We used this systematic approach because we thought it was

[3] Indiana is a state that provides half-day kindergarten as an option for families, but does not require kindergarten. During the past few years, several schools used ELIGP funding to offer full-day kindergarten as an option.

Figure 1: Framework for Assessing Early Literacy Interventions



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crucial to have a way of assessing the features of literacy programs that were actually implemented, rather than simply knowing which programs or features they intended to implement. By asking questions about actual features that were used in the schools, we could control for the types of program features that were already in use in these schools.

The survey instrument, the Early Literacy Intervention Survey[4], included questions about the types of reading programs that were implemented, the amount of time per day spent on reading, the features of the early reading program, the number of students referred and retained, and enrollment information that could be used to impute special education referral and retention rates. In addition, we had access to a state level database with information on test scores.

The survey assessed the frequency of use of nine organizational and structural features (ability grouping, basal readers, child-initiated learning centers, independent reading, one-on-one tutorial, pullout instruction, small groups, systematic evaluation and trade books). It also assessed the frequency of use of ten classroom instructional methods (Big Books, cooperative learning, creative writing and/or essays, drama, emergent spelling, paired reading, phonics, reading aloud, reading drills, and worksheets/workbooks). For these questions, survey participants were asked to indicate the frequency of use, using a five-point scale from 1 for "never" to 5 for "everyday" for both the current year and the prior year by grade level (K, 1, 2, 3). The survey also asked whether five types of professional development processes (certified training, certified specialist, in-service workshops, networking, and opportunity for collaboration) and five features related to parent involvement (book distribution, family literacy, paired reading, parent conference, and parent volunteers) were used in Kindergarten through grade three.

Survey of Schools

This study reports analyses for three years of surveys of funded and comparison schools. The number of schools surveyed and response rates are reported in Table 2. The samples were adjusted for corporation type (urban, rural, etc.), to ensure that the survey represented the diversity of schools in the state. The response rate varied by type

[4] Copies of the Survey can be obtained on request from the Indiana Education Policy Center. A simplified version of the instrument (St. John, Manset, Bardzell, & Michael, 1999) that can be used to survey teachers is available on line (Appendix A in St. John, Bardzell, & Associates, 1999).

of school over the years, though the responses were consistently higher in funded than comparison schools.

Table 2 Number and Response Rate of Surveyed Schools

	Funded	Comparison	Total
1997-1998			
Surveyed	262	351	613
Responded	167	182	349
Rate	64%	52%	57%
1998-1999			
Surveyed	289	359	648
Responded	170	108	278
Rate	59%	30%	43%
1999-2000			
Surveyed	186	373	459
Responded	147	133	280
Rate	79%	36%	61%

Note: Some schools were funded or received a survey in more than one year.

Each year we sampled about one-half of the schools that had not been funded by the program. Therefore, to adjust for the probability of being sampled, we weight the sample as noted in Table 4. The remainder of this report uses the adjusted sample.

Research Approach

Because we were interested in both assessing the impact of funding through ELIGP and the impact of the different types of early reading interventions, we decided to compare two approaches to specifying reading intervention in multiple regression analyses. One approach involved distinguishing the types of programs funded (Reading Recovery, OELI-K, OELI-PK, OELI-FDK, and OELI-1-3). The second approach examined the types of research-based interventions that were being used in the schools, but did not specifically consider the source of funding. By comparing these two types of approaches, it was possible to build an understanding both of the effects of funding and of the effect of different types of research-based interventions.

Statistical Methods

The study used descriptive statistics, factor analysis, and multiple regression. The descriptive statistics are used to describe the characteristics of the three-year sample.

A factor analysis was run for 19 variables related to instructional and classroom program features. Specifically, the average Likert score for the three grades 1-3 was imputed for the 19 program features on instruction and structural/organization on the

survey. A conservative factor loading minimum of .50 was used. Missing items were replaced with mean values.

Ordinary least squares (OLS) regression was used to estimate the influence of predictor variables on the three outcomes. We present R^2, plus three levels of significance (.01, .05, and .1) for each predictor variable. Since .1 is only a moderately significant association, we make note of this in the text, so the reader will not place undue emphasis on this statistical relationship.

Model Specifications

As noted above, we have two versions of the multiple regression models, one assessing type of funding and the other assessing type of intervention. In addition, we consider three distinct outcomes with each model: special education referral, retention in grade level, and passing rate on the state's third grade reading test (ISTEP+). Initially, we used sequential regressions, adding blocks of related variables in each subsequent step. The blocks of variables included:

- *School Characteristics*: The average ISTEP+ score, the percentage of students receiving free or reduced lunch, the percentage of minority students, and school locale coded as urban, rural, or town/suburb.
- *Funding Type or Intervention Type*: In the analyses of funding types, we considered RR, OELI-1-3, OELI-K, OELI-FDK, and OELI-PK. In the analysis of intervention types, we considered Reading Recovery[5], Success For All, Literacy Collaborative, full-day kindergarten, First Steps, Even Start, Accelerated Schools[6], and Four Blocks Method. The two type variables are not mutually exclusive.
- *Professional Development*: Whether reading teachers are required to be certified, whether certified specialists are brought in for training sessions, whether in-service workshops were used, whether teachers networked with teachers in other schools, and whether teachers collaborated within the school on reading instruction are included in professional development.

[5] This variable coding included schools with Reading Recovery whether or not they were funded through ELIGP.

- *Instructional and Related Factors*: For this block of variables, we included the factor scores on each of the nine structural/organizational factors and ten classroom instructional features.

While we conducted sequential analyses, this report presents only one of these full analyses (see the Appendix). In one case there was a confounding relationship between the program type and instructional factors that merits discussion.

Limitations

This study has a few limitations that merit consideration by readers. First, our analyses consider school related outcomes rather than individual outcomes. While most reading research focuses on individual students, we felt it was important for the funding agency to understand whether their funding influenced school related outcomes. While this is an unusual approach, it is consistent with the ways school outcomes are frequently reported. Thus, this approach was appropriate for a policy study of this type.

Second, the survey asked a respondent to answer questions about program features for each grade level, rather than asking each teacher to respond to a questionnaire. We considered this approach appropriate for an initial test of the study methodology. In the future we plan to extend the method to include a survey of teachers, which would mean we could examine both school level and classroom level outcomes.

Third, we assumed that all schools in the funded and comparison groups had an equal probability of returning a survey. This assumption was necessary because of the statistical methods used here. This assumption is typical when researchers use survey responses in regression models.

Findings

Instructional and Related Factors

Because of the large number of program features related to instruction and the organization of reading programs at the grade level, we decided to conduct a factor analysis of the instructional and structural/organizational features. The factor analysis is presented in Table 3.

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[6] The ELIGP did not fund any Accelerated Schools, but this intervention type was discussed in documents disseminated through the program (St. John, Bardzell, & Associates, 1999) and there were a few Accelerated Schools in the State.

Table 3
Loadings for Instructional and Related Factors

	Loadings
(1) Connected-Text Approaches	
Independent Reading	.600
Cooperative Learning	.425
Creative Writing	.610
Emergent Spelling	.640
Paired Reading (Student-to-Student)	.648
Reading Aloud	.581
(2) Explicit/Direct Approaches	
Basal Readers	.576
Phonics Instruction	.587
Reading Drills	.688
Worksheets/Books	.702
(3) Child-Centered/Expressive Approaches	
Child-Initiated Learning Center	.701
Big Books	.537
Cooperative Learning	.481
Drama	.670
(4) Ability Group/Pullout Approaches	
Ability Grouping	.720
One-to-One Tutoring	.514
Pullout Instruction	.490
Small Group	.636
(5) Trade Books Approaches	
Basal Readers	-.494
Trade Books	.746
Big Books	.452

The *Connected-Text Approaches* factor includes independent reading, cooperative learning, creative writing, emergent spelling, paired reading (student-to-student), and reading aloud. Schools that make use of these methods combine techniques that engage students in the learning process.

The *Explicit/Direct Approaches* factor combines basal readers, phonic instruction, reading drills and worksheets/books. Schools that emphasize explicit approaches rely heavily on systematic approaches to teaching the components of language and reading.

The *Child-Centered/Expressive Approaches* factor combines child-initiated learning centers, Big Books, cooperative learning, and drama. These instructional approaches place an emphasis on the development of the whole child and peer engagement among children.

The *Ability Group/Pullout Approaches* factor combines ability grouping, one-to-one tutoring, pullout instruction, and small groups. Schools that use these techniques place more emphasis on classifying children and accelerating the learning of some, while addressing developmental needs of others.

The *Trade Books Approaches* factor combines trade books and Big Books, but de-emphasizes basal readers. Schools that use this approach emphasize texts that are literature-based and engaging for students, rather than emphasizing the elements of reading programs that are structured around increasing levels of difficulty.

Our analyses of the impact of literacy interventions consider the direct effects of these instructional and related factors on student outcomes. In general, these factors had an effect independent of the type of funding and the type of intervention although there were a few exceptions (see the Appendix).

Sample Characteristics

The characteristics for the sample are presented in Table 4. The average special education referral rate for the schools surveyed was .05, with a standard deviation of .03. The average retention rate was .02 with a standard deviation of .02. The average passing rate was .68, with a standard deviation of .14.

In the average school in the sample, 26% of the students qualified for free or reduced lunch and 13% were minority. About one-fifth of the schools were in urban areas (18.5%) and about one-third were in rural areas (31.9%).

Table 4
Descriptive Statistics of the Sample

	Mean (%)[7]	S.D.
Outcome Variables		
Special education grade 1-3	.05	.03
Grade retention grade 1-3	.02	.02
% Passing ISTEP English/Language Arts Scale Score	.68	.14
School Characteristics		
ISTEP Reading Raw Score	34.44	2.38
% Free or Reduced Lunch	.26	.18
% Minority	.13	.20
Urban[8]	18.5%	
Rural[8]	31.9%	
ELIGP Funding Type[9]		
RR	22.6%	
OELI	14.5%	
OELI-K	1.2%	
FDK	1.5%	
PREK	.5%	
Intervention Type[10]		
RR	40.8%	
Success for All	1.4%	
Literacy Collaborative	3.1%	
Full-Day Kindergarten	12.3%	
First Steps	3.0%	
Even Start	.9%	
Accelerated Schools	.7%	
Four Blocks	12.5%	
Professional Development		
Certified Training	32.7%	
Certified Specialist Grade	34.4%	
In-service Workshops	77.0%	
Networking	66.1%	
Opportunity for Collaboration	73.5%	
Parent Involvement		
Book Distribution	50.9%	
Family Literacy	30.5%	
Paired Reading (Parent-to-Child)	76.2%	
Parent Conferences	97.3%	
Parent Volunteers	64.2%	
N	823	

Note: double weight was given to comparison schools.

[7] Percentages only are reported for dichotomous variables. Averages and standard deviations are reported when percentages are used as continuous variables.
[8] Schools in town and suburban locales were the reference group.
[9] Schools not receiving ELIGP funding were the reference group.
[10] Schools having no or other interventions were the reference group.

A slightly larger percentage of the sample was funded through Reading Recovery (22.6%) than through OELI-1-3 (14.5%) or the other types of programs. Further, a substantially larger percentage of the sample had Reading Recovery in their schools (40.8%) than were funded through ELIGP, indicating that many schools continued the program after training. In addition, Success for All (1.4%) and Literacy Collaborative (3.1%) were not widely used, while full-day Kindergarten (12.3%) and Four Blocks Method (12.5%) were moderately used. Since a relatively large percentage of schools had ongoing programs related to full-day Kindergarten and Four Blocks Method, it is apparent that schools found funding sources other than ELIGP to develop and maintain these programs. This illustrates why it was necessary to consider the impact of the types of programs, as well as the types of funding in this analysis.

In service workshops, networking, and collaboration were used in most Indiana schools, a pattern that is consistent with the state's commitment to support ongoing professional development (Bull & Buechler, 1996). In addition, most schools had multiple types of parent involvement.

The Impact of Funding Type

Analyses of the impact of specific types of program funding are important for funding agencies in assessing whether their funding made a difference for students. Table 5 presents the multiple regression analyses of the three outcomes.

Referral Rates: While four variables were significantly associated with special education referral, the model explained only 5.1% of the variance in referral rate. Therefore, readers are reminded that the relative impact of reading interventions on special education referral is modest.

Table 5
The Impact of Funding Type: Standardized Coefficients of Predictors of Special Education Referral Rate, Retention Rate and Passing Rate on ISTEP+ English/Language Arts Scale Score

VARIABLES	Referral Rate		Retention Rate		ISTEP+ Score	
	Beta	Sig.	*Beta*	Sig.	*Beta*	Sig.
School Characteristics						
ISTEP Reading Raw Score	-.098**		.023		.431***	
% Free or Reduced Lunch	.210***		.186***		-.319***	
% Minority	-.065		.215***		-.143***	
Urban[11]	-.028		-.052		-.039	
Rural[5]	.015		.061*		-.055	
ELIGP Funding Type[12]						
RR	-.058		-.045		-.178***	
OELI	-.084**		-.073**		.059	
OELI-K	.030		-.042		.009	
FDK	-.042		-.017		-.045	
PREK	.006		.071**		-	
Professional Development						
Certified Training	.052		.005		-.017	
Certified Specialist Grade	.040		-.003		-.016	
In-service Workshops	-.019		.040		-.044	
Networking	-.013		-.016		.000	
Opportunity for Collaboration	-.020		-.100***		-.011	
Parent Involvement						
Book Distribution	-.034		-.005		.107**	
Family Literacy	-.051		.039		-.072*	
Paired Reading	-.019		-.085**		-.041	
Parent Conferences	.010		.083**		.090**	
Parent Volunteers	.026		-.041		-.007	
Program Feature Factors						
Connected-Text Approaches	.062*		-.097***		-.021	
Explicit/Direct Approaches	-.056		.092***		.074*	
Child-Centered/Expressive Approaches	.009		.106***		.036	
Ability Group/Pullout Approaches	.048		-.018		.043	
Trade Books Approaches	.054		-.056		-.005	
Adjusted R^2	.051		.148		.628	
N	823		823		279	

Note: * $p \leq .1$, ** $p \leq .05$, *** $p \leq .01$.

[11] Schools in town and suburban locales were the reference group.
[12] Schools not receiving ELIGP funding were the reference group.

Two variables related to school characteristics were significant. Schools with higher ISTEP+ raw scores refer more students for special education, controlling for other variables in the model. In contrast, having a higher percentage of students on free and reduced lunch, or higher poverty rates, was associated with higher referral rates. These relationships are consistent with prior research (Snow et al., 1998).

Only one of the funding types was significant. Having an OELI project in grades 1-3 reduced special education referral. This means that classroom-wide and school-wide interventions had more impact on this outcome than pullout programs (e.g., Reading Recovery).

Finally, only one of the instructional and related factors had a significant association with special education referral. Connected-Text Approaches had a slight positive association with special education referral (significant at the .1 level). However, this is a confounding relationship attributable to the types of programs funded through OELI, as noted in the discussion of intervention types below.

Retention Rates: The regression model predicted grade retention rates better than it predicted special education referral rates. These variables explained 14.8% of the variance in retention rates. Eleven of the variables had a significant relationship with retention rates.

Three of the school-characteristic variables were significantly associated with retention rates. High percentages of students on free or reduced lunch and high percentages of minority students were associated with higher retention rates. Schools located in rural corporations were also associated with higher retention rates, although this association was weak.

Two types of program funding were significant. OELI programs in grades 1-3 were negatively associated with retention. Apparently school-wide and classroom-wide interventions helped reduce grade level retention below what would have been expected without this funding. In addition, schools with pre-K programs had higher retention rates, an issue that merits further exploration.

One variable related to professional development was negatively associated with retention rates, the opportunity to collaborate, i.e. when teachers collaborate, fewer students are retained. There are at least a couple of possible explanations for this finding.

It is possible that collaboration within grade level provides teachers the opportunity to concentrate more on early reading instruction. It is also possible that better collaboration across grade levels helps teachers understand what students need to know in order to be successful at the next level.

Two variables related to parent involvement were also significant. When paired reading between parents and their children was encouraged, there were lower retention rates. This finding supports assertions that parent involvement in early learning is crucial, as a form of cultural capital (Gordon, 2000). Having more parent conferences was associated with higher retention rates. It is possible that teachers hold conferences with parents more frequently when referral is being considered.

Three of the instruction and related factors were associated with retention rates. Connected-Text Approaches was associated with lower retention rates. Presumably, using methods that engage students increases their interest in school. In contract, Explicit/Direct Approaches was associated with higher retention rates. This means that the more phonics and other explicit approaches are used in early reading programs, the more likely schools are to retain their students because they have not learned or completed the material. Finally, Child-Centered/Expressive Approaches was also associated with higher retention rates. The possible explanations for this relationship merit further exploration.

ISTEP+ Passing Rates: The model predicts passing rates better than it predicts the other two outcomes, as evidenced by the fact that these variables explain 62.8% of the variance in passing rates. Eight variables were significant.

Three of the school characteristics were significant. Having high ISTEP+ scores was associated with higher passing rates, while having high percentages of poor students or minorities was associated with lower passing rates. These findings are entirely consistent with prior research on early reading (Snow et al., 1998).

One of the intervention types was significant. Having funding for Reading Recovery was negatively associated with high passing rates. This could be an artifact that funding was associated with having a teacher in training, a characteristic of schools in early stages of implementing a Reading Recovery program. We suggest this possibility

because Reading Recovery as a program type was not significantly associated with this outcome (see the analysis of funding types below).

Three parent involvement variables were associated with higher passing rates. Book distribution and parent conferences were associated with higher passing rates. This means that providing books for parents to read with their children and conferencing with parents improved the chances that student will pass this statewide achievement test.

Further, family literacy programs were negatively associated with passing rates. Family literacy programs are offered in school where parents cannot read, possibly because English is their second language or because their own education is limited. This finding could be an artifact that parents who cannot read are less able to help their children learn to read, indicating limited cultural capital in the home.

Finally, one of the instructional factors was statistically significant. Using Explicit/Direct Approaches was modestly associated with improved passing rates (significant at a .1 level). Thus phonics, worksheets, and other explicit approaches were associated with higher passing rates, but this was not a strong relationship.

The Effects of Funding Types: When we look across these models, the evidence suggests that the school-wide and classroom-wide interventions funded through ELIGP had an impact on reducing special education referral and retention rates, outcomes that are associated with increased efficiency in the educational system. In contrast, Reading Recovery was not associated with either of these attainment-related outcomes, which are frequently mentioned in the Reading Recovery literature (e.g., Lyons, 1994), but was associated with lower rates of passing on standardized tests. While the finding regarding passing rates is probably an artifact (discussed below), the failure to find statistically significant relationships between Reading Recovery and these attainment outcomes is a bit more problematic for the advocates of this program. Indeed, this finding echoes conclusions reached by the National Research Council (Snow et al., 1998).

The Impact of Intervention Types

The analysis of the effects of the intervention type is presented in Table 6. The analyses use the same model as the prior analyses except the block of variables pertaining to funding type was replaced with a block of variables pertaining to program type.

Table 6

The Effects of Intervention Type: Standardized Coefficients of Predictors for Special Education Referral Rate, Retention Rate and Passing Rate in ISTEP+ English/Language Arts Scale Score

VARIABLES	Referral Rate		Retention Rate		ISTEP+ Score	
	Beta	Sig.	*Beta*	Sig.	*Beta*	Sig.
School Characteristics						
ISTEP Reading Raw Score	-.127***		-.004		.478***	
% Free or Reduced Lunch	.180***		.167***		-.294***	
% Minority	-.040		.225***		-.096*	
Urban[13]	-.029		-.043		-.035	
Rural[13]	.030		.070*		-.035	
Intervention Type[14]						
RR	-.001		-.085**		.010	
Success for All	-.078**		-.056*		.023	
Literacy Collaborative	-.096***		-.051		.000	
Full-Day Kindergarten	.035		-.029		-.046	
First Steps	-.083**		-.001		-.068*	
Even Start	-.030		-.005		.095**	
Accelerated Schools	.006		.032		-.062	
Four Blocks	.074**		.015		-.007	
Professional Development						
Certified Training	.040		.006		-.046	
Certified Specialist Grade	.019		.005		-.020	
In-service Workshops	-.012		.049		-.019	
Networking	-.030		-.016		-.049	
Opportunity for Collaboration	-.022		-.111***		-.027	
Parent Involvement						
Book Distribution	-.030		-.002		.123***	
Family Literacy	-.068*		.024		-.062	
Paired Reading	-.016		-.086**		-.030	
Parent Conferences	.008		.092***		.094**	
Parent Volunteers	.020		-.055		-.008	
Program Feature Factors						
Connected-Text Approaches	.061		-.085**		-.021	
Explicit/Direct Approaches	-.046		.083**		.098**	
Child-Centered/Expressive Approaches	.026		.114***		.024	
Ability Group/Pullout Approaches	.075**		.001		.020	
Trade Books Approaches	.037		-.061*		-.002	
Adjusted R^2	.066		.147		.609	
N	823		823		279	

Note: * $p \leq .1$, ** $p \leq .05$, *** $p \leq .01$.

[13] Schools in town and suburban locales were the reference group.

[14] Schools having no or other interventions were the reference group.

Referral Rates: The analysis of special education referral rates shows that school characteristics had similar effects as in the prior analyses. However, more types of programs were statistically significant, and the R^2 was slightly higher. There were also differences in the influence of program features.

Four types of literacy interventions were statistically significant. Three were negatively associated with referral—Success for All, Literacy Collaborative, and First Steps—indicating that implementing these programs may have helped reduce referrals. In contrast, one program type, Four Blocks Method, was positively associated with special education referral, indicating implementation of this program may have increased referrals.

One parent involvement variable was significant, which had not been the case in the prior analysis. Family literacy was significant and negatively associated with referral, once we controlled for the types of programs. This indicates that family literacy programs, involving parents in learning to read, may have helped reduce special education referrals.

Interestingly, the influence of instruction and related factors changed when intervention types were considered. The variable Connected-Text Approaches was no longer significant while Ability Group/Pullout Approaches was significant and positive. This means that more extensive use of small groups was associated with higher referral rates.

The changes in significance of parent-involvement variables and of the factors indicate a confounding relationship between these variables and program type. There may be logical reasons why the combinations of features in some interventions interact with these variables. The prospect merits further exploration.

Retention Rates: The analysis of the influence of intervention types on grade retention also shows school characteristics continued to have a similar influence. In addition, the variance explained by the two models was similar.

Reading Recovery and Success for All were significant and negatively associated with retention. Reading Recovery was significant (.05), while Success for All had a weaker association (.1). Implementation of these programs may have reduced grade level retention and thus improve system efficiency.

The influence of variables related to professional development, parent involvement, and Instruction and related factors was similar to the prior model. There was a slight change in the significance of Trade Books Approaches, which had a slight negative association (.1), but had not been significant when funding type was considered.

Passing Rates: The analysis of the influence of intervention types on passing rates did not explain as much variance as the prior model (.609 compared to .628 in the prior model). Again, school characteristic variables had similar effects as in the prior analysis.

Two types of programs had a significant association with passing rates. Even Start was significant and positively associated with passing rates. This suggests that, controlling for poverty and ethnicity, schools that start children in a pre-Kindergarten program that involves exposure to literature can improve passing rates when these children reach third grade.

First Steps was slightly significant (.1) and negatively associated with passing rates. However, its significance was an artifact of a confounding relationship with Explicit/Direct Approaches (see the Appendix). Specifically, schools that used First Steps seemed to include more emphasis on explicit approaches.

The Effects of Intervention Types: The analysis of intervention types reveals that it is important to consider the types of programs, as well as funding types. In one case the model explained more variance and in another explained less variance. These analyses did provide insight into the effects of different types of programs.

This analysis confirms that classroom-wide and school-wide interventions have a substantial influence and also indicates which ones seem to have an influence. Specifically, Success for All was associated with more favorable rates on both attainment-related outcomes (i.e., lower retention and referral rates). Literacy Collaborative and First Steps were also associated with lower special education referral. In contrast, Four Blocks Method was associated with higher referral rates.

In addition, the second set of analyses provided a fuller assessment of the effects of Reading Recovery. When only programs that had teachers in training were considered, then Reading Recovery appeared to be associated with higher passing rates, while this was no longer the case when schools that had ongoing Reading Recovery programs were also considered. In addition, when we considered ongoing Reading

Recovery programs along with the schools currently receiving training, having a Reading Recovery program was associated with lower retention rates. This suggests that over time, having Reading Recovery can enable more students to make normal progress in their early primary education.

Conclusions and Implications

These analyses not only indicate that it is possible to assess the effects of state funding for early reading interventions, but also that the relationships are complex and should be examined from multiple vantages. Based on these analyses, we reach a few conclusions about the implications for schools and state policy.

First, it is apparent that school-wide and classroom-wide methods have more substantial and immediate influence on student progress in school. These interventions reach more children in a shorter amount of time, enabling more children to stay in the regular classroom and to progress. Indeed, interventions like Success for All and Literacy Collaborative appear to provide some of the services that meet the special needs of some children who might otherwise be referred to special education.

Second, it is also apparent that the positive effects of Reading Recovery take time to emerge. Ongoing Reading Recovery programs appear to have more influence on student progress than does having a teaching in training. This means that benefits of this type of investment in professional development are realized over time rather than immediately. Indeed, it seems shortsighted to expect Reading Recovery to have an influence on student outcomes during the first year of implementation.

Third, it appears that funding and implementing research-based interventions influence student outcomes. Both types of programs funded through ELIGP in Indiana—Reading Recovery and other interventions—appear to have influenced student outcomes, suggesting that states probably can enhance student outcomes if they are willing to provide categorical grants that encourage schools to select interventions that meet their local needs.

Fourth, there is some reason to expect that locally designed interventions can also have a positive impact on improving reading-related outcomes. We reach this conclusion because the instruction and related factors had direct effects on literacy outcomes after

controlling for program type. Future studies should explicitly consider which combinations of factors are associated with improvement in outcomes in schools with locally designed interventions.

The primary implication of these analyses for states is that it is important to assess the impact of categorical grant programs. The ELIGP in Indiana encouraged schools to assess local needs and to develop intervention approaches that met those needs. Schools had the option of having a teacher trained in Reading Recovery, selecting a research-based method, or developing an intervention locally. This study confirms that providing this local discretion appears to work well.

For schools, this study provides evidence about the impact of different types of early literacy interventions. In particular, the study suggests that schools should seek a balance between Explicit and Holistic Approaches to early reading. Explicit Approaches were positively associated with higher passing rates on achievement tests but also appeared to increase grade retention rates. In contrast, Holistic Approaches were negatively associated with retention rates, indicating they were successful in engaging students in reading and creating a desire to make academic progress. Thus, when selecting or designing an intervention, planning teams in schools should consider how the intervention would enable them to build an appropriate balance.

Appendix: Supplementary Analysis

Sequential regression analysis provides insight into the confounding relationship between different types of variables, as illustrated in Table A.1. This analysis presents the sequential analysis of the influence of program types on passing rates. Most of the variables have consistent effects across the models and these effects were discussed in the paper. However two specific chances in significance of intervention types merit the reader's attention.

First, it should be noted that First Steps was not significant in the first three steps in which it was included, but was significant when the instruction factors were considered. Specifically, the Explicit/Direct Approaches factor was significant in this step, indicating the confounding influence of this variable. Specifically, the significance of First Steps in the last step appears to be an artifact of the inclusion of the factors. This relationship merits further examination in future studies.

Second, Accelerated Schools was associated with lower passing rates before parent involvement was considered. In that step, both book distribution and parent conferences were significant. It is apparent that Accelerated Schools in Indiana are different from other interventions in their approach to parent involvement. This relationship also merits further examination.

Table A.1
The Effect of Intervention Type: Standardized Coefficients of Predictors of Passing Rates on ISTEP+ English/Language Arts Scale Score in a Stepwise Regression

VARIABLES	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
School Characteristics										
ISTEP Reading Raw Score	.469	***	.481	***	.490	***	.492	***	.478	***
% Free or Reduced Lunch	-.301	***	-.290	***	-.283	***	-.277	***	-.294	***
% Minority	-.124	**	-.107	**	-.098	*	-.114	**	-.096	*
Urban[15]	-.054		-.036		-.040		-.032		-.035	
Rural[15]	-.044		-.027		-.028		-.040		-.035	
Intervention Type[16]										
RR			-.008		.003		-.014		.010	
Success for All			.015		.018		.020		.023	
Literacy Collaborative			-.001		-.005		-.004		.000	
Full-Day Kindergarten			-.042		-.042		-.039		-.046	
First Steps			-.043		-.049		-.059		-.068	*
Even Start			.096	**	.096	**	.101	**	.095	**
Accelerated Schools			-.090	**	-.087	**	-.060		-.062	
Four Blocks			-.034		-.033		-.011		-.007	
Professional Development										
Certified Training					-.028		-.051		-.046	
Certified Specialist Grade					-.014		.001		-.020	
In-service Workshops					.009		-.011		-.019	
Networking					-.037		-.043		-.049	
Opportunity for Collaboration					-.018		-.041		-.027	
Parent Involvement										
Book Distribution							.116	***	.123	***
Family Literacy							-.065		-.062	
Paired Reading							-.048		-.030	
Parent Conferences							.089	**	.094	**
Parent Volunteers							-.010		-.008	
Program Feature Factors										
Connected-Text Approaches									-.021	
Explicit/Direct Approaches									.098	**
Child-Centered/Expressive Approaches									.024	
Ability Group/Pullout Approaches									.020	
Trade Books Approaches									-.002	
Adjusted R^2	.589		.599		.595		.608		.609	
N	279									

Note: * $p \leq .1$, ** $p \leq .05$, *** $p \leq .01$.

[15] Schools in town and suburban locales were the reference group.
[16] Schools having no or other interventions were the reference group.

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